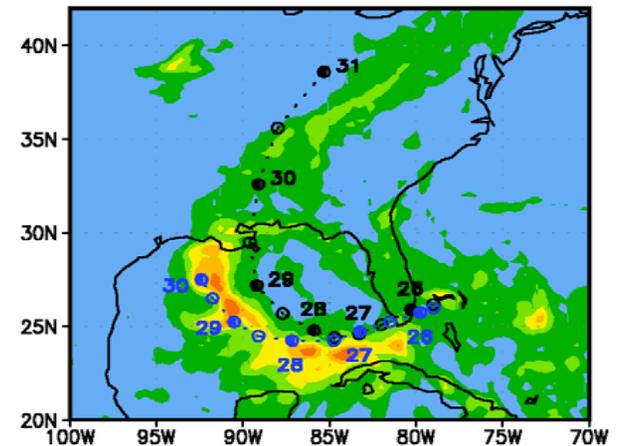
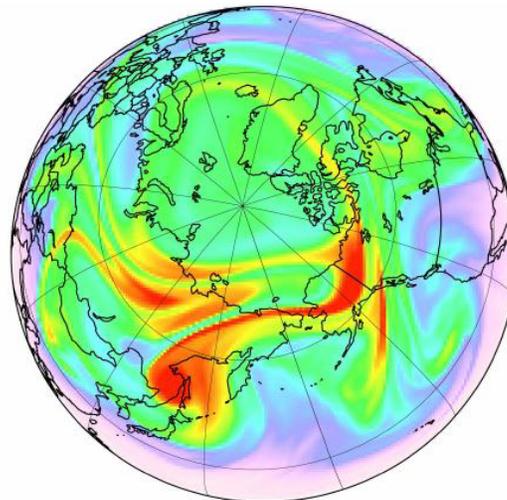
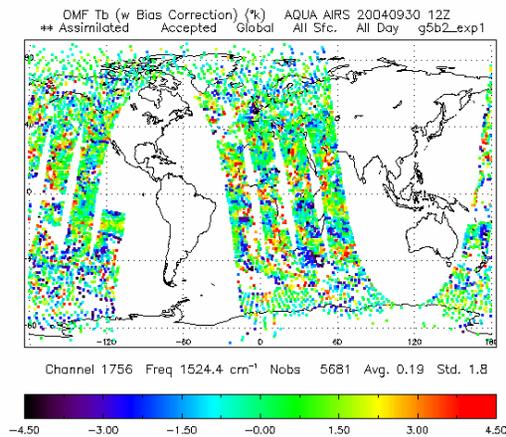


GMI Chemistry, GEOS-5 and MAP

GMAO-SIVO Working Group - Report to GMI Workshop

June 16, 2007



GMI in the MAP Framework

From GMI's Web Site:

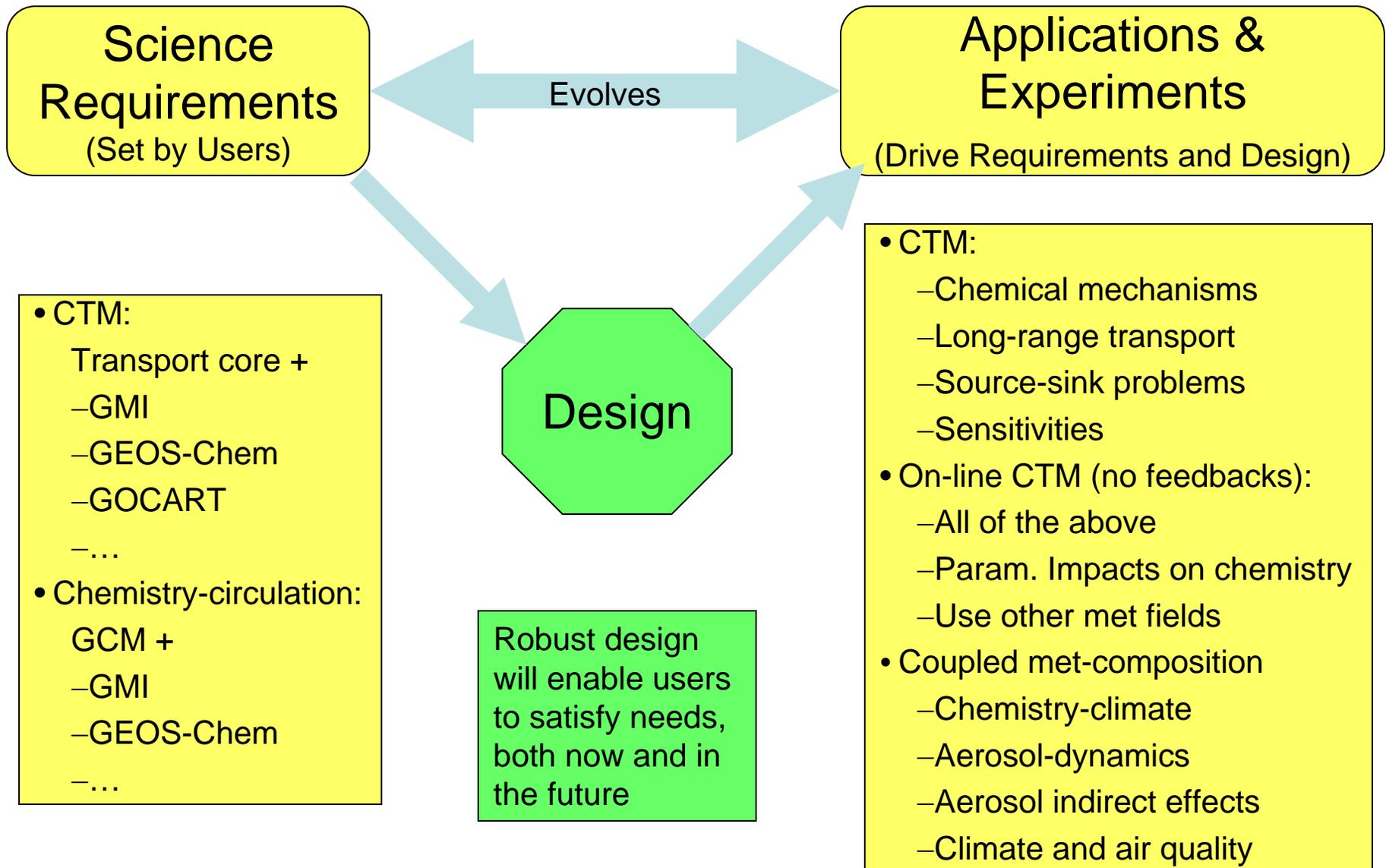
The GMI Philosophy: Process-Oriented Evaluation

The motivation for the Global Modeling Initiative is to reduce uncertainty in assessment calculations. ...

Our objective:

To provide an enabling “infrastructure” for robust combination of GMI chemistry modules with GEOS-5 (and other) weather-climate modules

Chemical Modeling Hierarchy

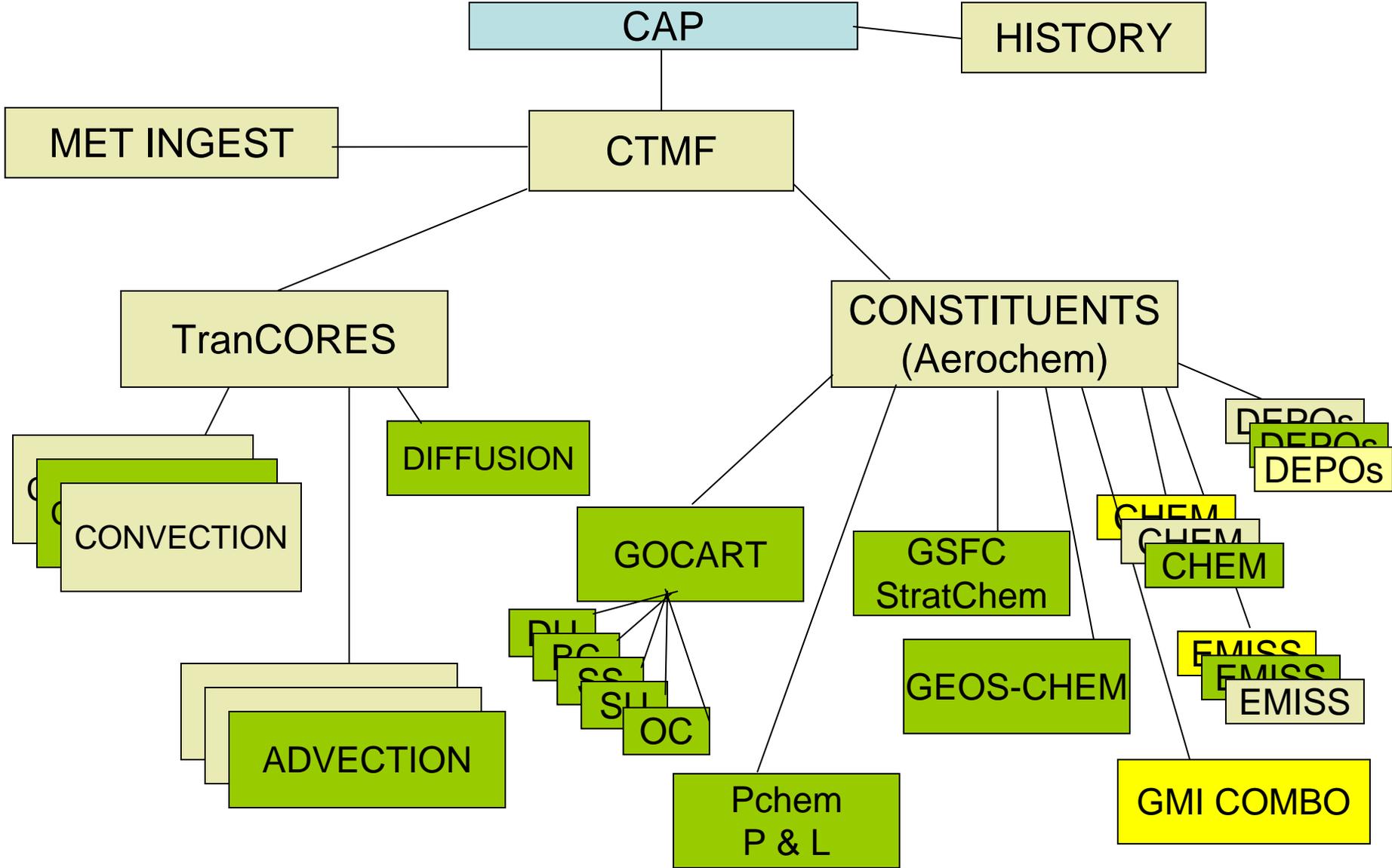


Decisions of GMAO-SIVO Working Group

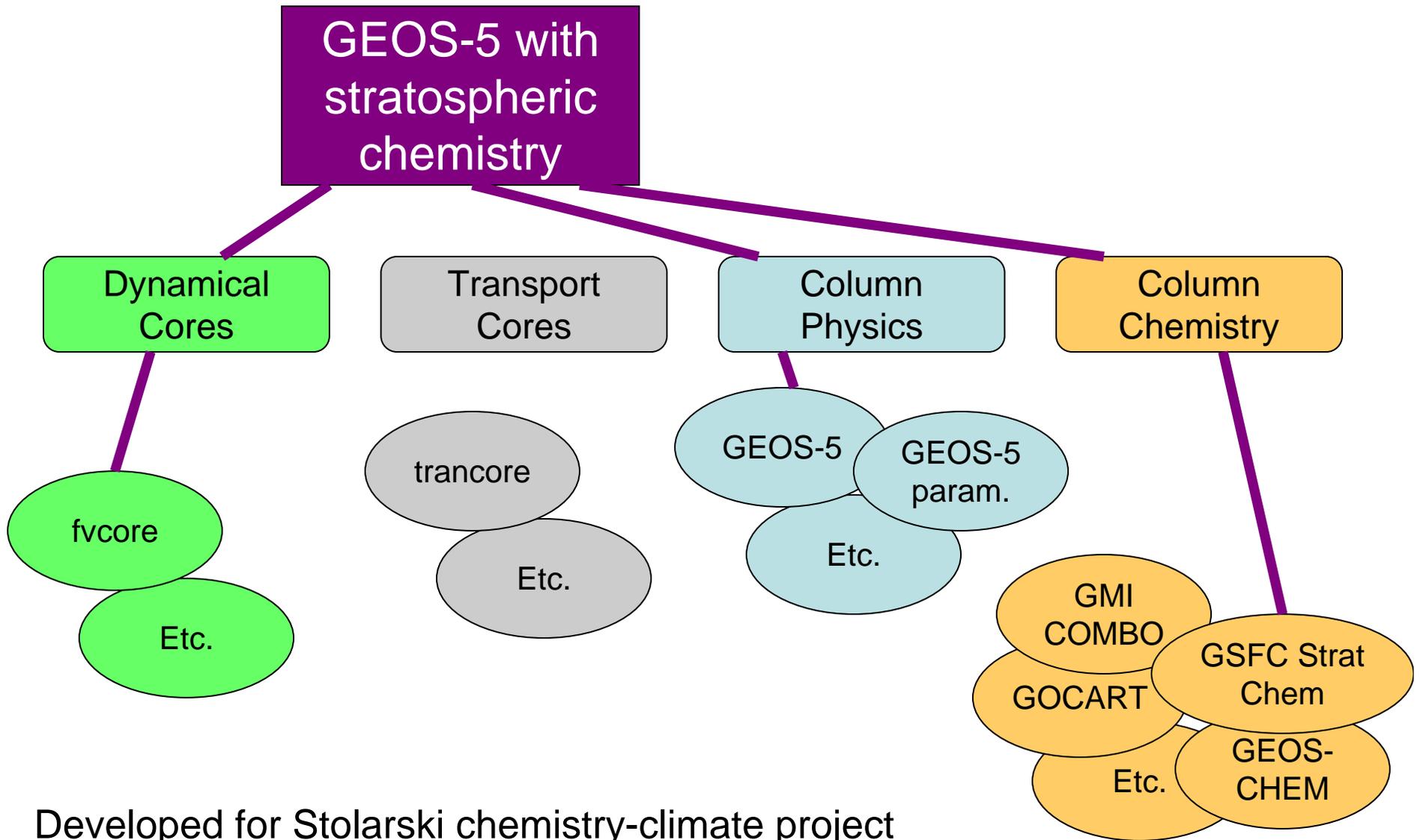
We will implement modules into the MAP Modeling Environment used by GEOS-5, adopting:

- (1) SIVO's code changes for GMI chemistry (modular code for ESMF) [Clune, Womack, et al.]
- (2) GMAO's "Aerochem" interface to connect chemistry modules to GEOS-5 GCM & CTMs [da Silva et al.]
- (3) MAPL toolkit to provide functionality [Suarez et al.] - enhancements to MAPL will be needed for this work
- (4) Newly developed ESMF/MAPL based GEOS-5-compatible transport core will be available for CTM

MAP CTMF

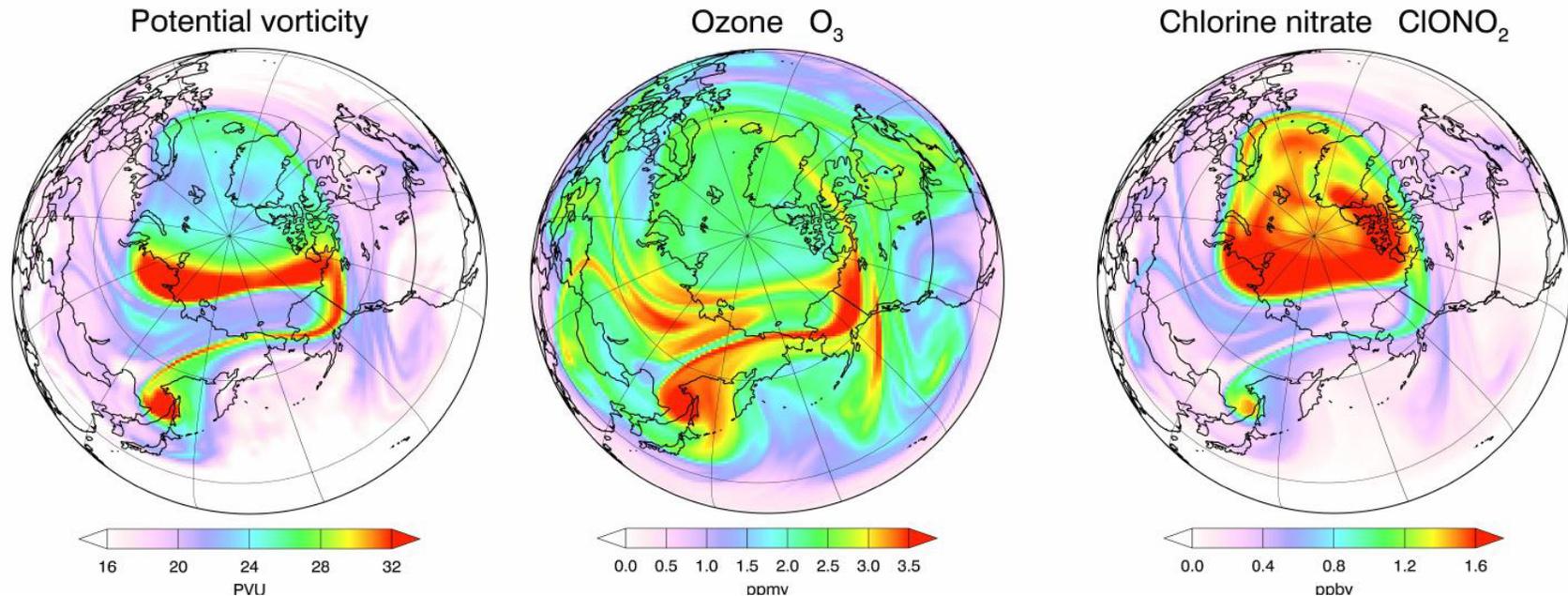


GEOS CCM, V2: A Working Example



Developed for Stolarski chemistry-climate project

High-resolution chemistry-climate model simulation with GEOS-5

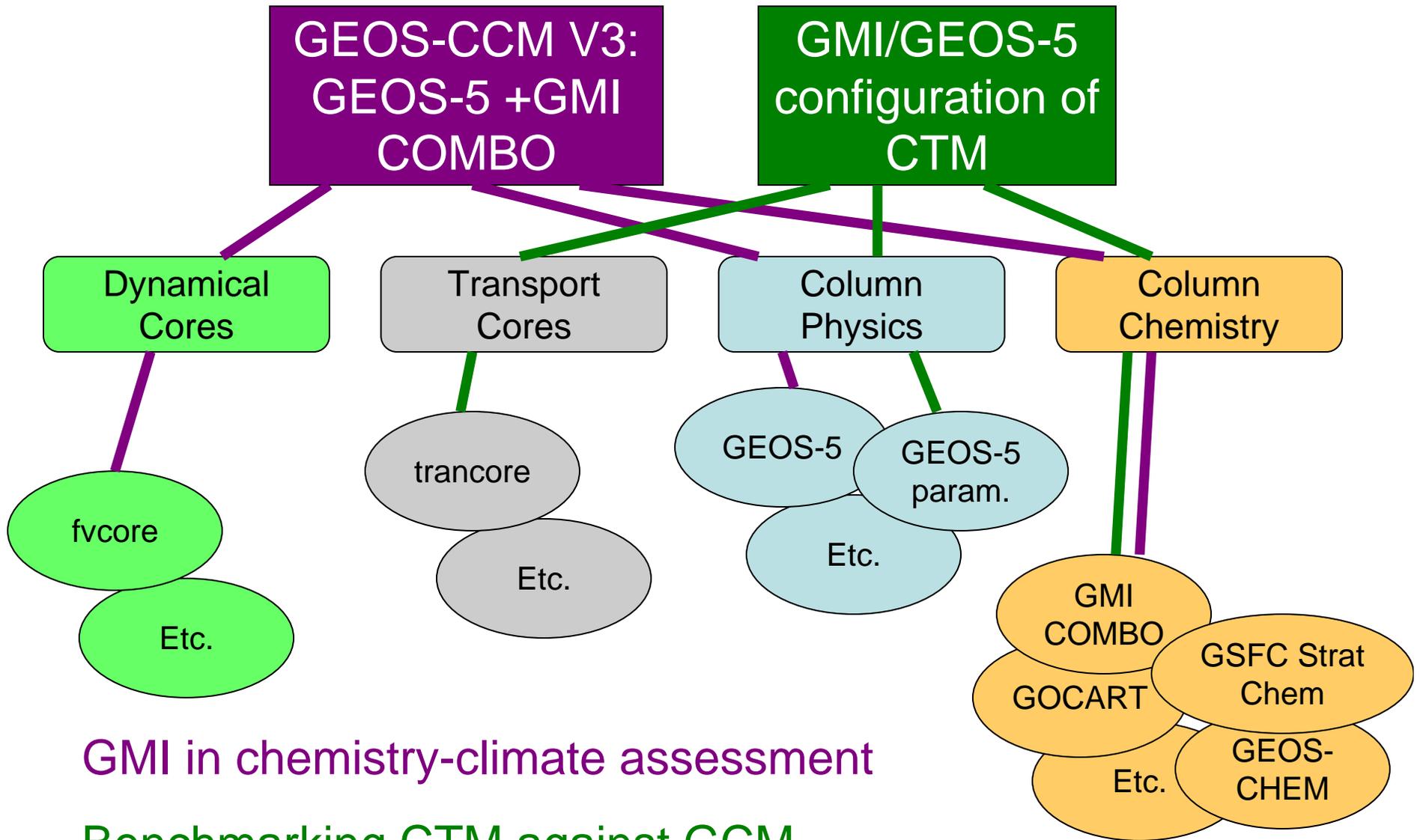


Composition-circulation simulated in a high resolution ($2/3^\circ$ longitude \times $1/2^\circ$ latitude) simulation of GEOS-5 with on-line stratospheric chemistry

PV, ozone and chlorine nitrate fields at 70hPa on April 1, near the end of a cold simulated Arctic winter

Coherent filaments are peeled from the edge and interior of the polar vortex

Enhanced Possibilities for GMI



GMI in chemistry-climate assessment

Benchmarking CTM against GCM

Summary

- GMAO and SIVO have unified their efforts to couple GMI chemistry modules into GEOS-5 environment
- Aim to support ESMF-based capabilities for GMI assessment tools:
 - CTM “framework” (traditional GMI approach)
 - CCM (Stolarski project: GEOS CCM, V3)
- Need to ensure that external groups remain supported
- Need to formalize mechanism for incorporating advances in chemistry code